REMARKS/ARGUMENTS

Claims 1-16, 18-37, and 39-69 are pending in this application. Claims 4-6, 16, 33-34, 36, and 43 have been amended to overcome the rejections under 35 U.S.C. § 112, second paragraph. Claim 3 has been amended to clarify that the first and second sets of ion exchange sites are discontinuous. Support for this limitation can be found, for example, on page 19, lines 8-9 of the specification.

The Examiner rejected Claims 1-69 under 35 U.S.C. § 102(e) as being clearly anticipated by the disclosure of U.S. Patent No. 6,719,828 ("U.S. 6,719,828").

As an initial matter, Applicant submits that the presently claimed invention and the subject matter of U.S. 6,719,828 were at the time of the claimed invention subject to an obligation of assignment to the same person. As such, Applicant requests that U.S. 6,719,828 be removed as a possible 35 U.S.C. § 103 reference pursuant to MPEP § 706.02(l)(1). MPEP § 706.02(1)(1) recites:

> Effective November 29, 1999, subject matter which was prior art under former 35 U.S.C. 103 via 35 U.S.C. 102(e) is now disqualified as prior art against the claimed invention if that subject matter and the claimed invention were, at the time the invention was made, owned by the same person or subject to an obligation of assignment to the same person.

The assignee of the presently claimed invention is ADA Technologies, Inc. *See* Exhibit A showing the assignment of the present application to ADA Technologies, Inc. U.S. 6,719,828 was also required to be assigned under an employment agreement between ADA Technologies, Inc. and the named inventors on U.S. 6,719,828, namely John S. Lovell, Craig S. Turchi, and Thomas E. Broderick, at the time the claimed invention was made. Although John S. Lovell, an employee of

ADA Technologies, was listed as the assignee on the face of the 6,719,828 patent, no assignment of U.S. 6,719,828 to John S. Lovell was ever executed or recorded. *See* Exhibit B showing the absence of an assignment of U.S. 6,719,828 to John S. Lovell in the USPTO assignment database. The listing of John S. Lovell as the assignee on the face of U.S. 6,719,828 was an inadvertent error caused by listing John S. Lovell as the assignee on the Issue Fee transmittal dated February 20, 2004, a copy of which is attached hereto as Exhibit C. U.S. 6,719,828 has now been properly assigned to ADA Technologies, Inc., the assignee of the presently claimed invention. Attached hereto as Exhibit D is a copy of a Recordation Form Cover Sheet and executed assignment of U.S. 6,719,828 from each of the inventors of U.S. 6,719,828, John S. Lovell, Craig S. Turchi, and Thomas E. Broderick. In view of the above, Applicants request U.S. 6,719,828 be removed as a possible 35 U.S.C. § 103 reference via § 102(e).

Applicant further submits that Claims 1-16, 18-37, and 39-69 are not anticipated by U.S. 6,719,828 because U.S. 6,719,828 does not teach or suggest at least the following italicized language of the independent claims:

> 1. A particle for removing a contaminant from a fluid, comprising:
>
> a substrate having an ion exchange capacity of at least about 50 mEq/100g and a plurality of ion exchange sites, *wherein the plurality of ion exchange sites comprise a first set of sites that are pH independent and a second set of sites that are pH dependent*; and
>
> polyvalent metal sulfides located at each of the plurality of ion exchange sites.
>
> 14. A process for treating a fluid comprising at least one ionic contaminant, comprising:
>
> providing a contaminant removal agent, the agent comprising a polyvalent metal sulfide located *at pH dependent ion exchange sites on a surface of a substrate*; and

contacting the fluid with the agent to remove at least most of a mercury-containing contaminant from the fluid to form a treated fluid and a mercury-bearing agent.

27. A method for manufacturing a contaminant removal agent, comprising:

(a) providing a substrate having a plurality of ion exchange sites; and

(b) contacting a solution comprising dissolved polyvalent metal ions with the substrate to form an ion exchanged substrate having polyvalent metal ions exchanged at the plurality of ion exchange sites, *wherein the pH of the solution in the contacting step is greater than the* pH_{ZPC} *for the substrate.*

44. A system for purifying a mercury-containing fluid, comprising:

a device operable to contact the fluid with a contaminant removal agent, the agent comprising a substrate having an ion exchange capacity of at least about 50 mEq/100g and a plurality of ion exchange sites, *wherein the plurality of ion exchange sites comprise pH dependent sites and pH independent sites, and wherein polyvalent metal sulfides are located at each of the plurality of ion exchange sites*;

an input into the vessel for the fluid; and

an output from the vessel for a treated fluid.

57. An intermediate product in the manufacture of a particle for removing a contaminant from a fluid, comprising:

a substrate having an ion exchange capacity of at least about 50 mEq/100 g and a plurality of ion exchange sites; and

polyvalent metal and ammonia complexes at each of the plurality of ion exchange sites.

In particular embodiments of the claimed invention, there is provided a contaminant removal agent, process, and system that provides a substrate having polyvalent metal sulfides at both pH dependent and pH independent ion exchange sites. For example, in one embodiment of the claimed invention, the formation of both pH dependent and independent sites is accomplished by contacting a solution including dissolved polyvalent metal ions with a solution having a pH which is greater than the pH_{ZPC} of the substrate (and typically an alkaline pH), wherein ZPC refers to the zero point of charge. At pH's above the pH_{ZPC} of the substrate, pH dependent sites on the substrate are negatively charged and the polyvalent metal is in the form of a compound that is soluble under alkaline conditions, such as an ammonia complex. *See* page 11, line 6 to page 12, line 17. The polyvalent metal is thereafter ion exchanged for a metal on the substrate to form pH dependent sites on the contaminant accessible surface, edges and corners of the substrate, as well as within the interlayer region of the substrate. *See* Fig. 1 and page 21, line 11 to page 22, line 2 of the specification (emphasis added). The availability of both pH dependent ion exchanged sites on the surfaces, edges, and corners of the substrate in addition to the pH independent sites of the interlayer region can substantially enhance the contaminant removal efficiency as compared to U.S. 6,719,828, discussed below, wherein the ion exchange sites are pH independent only and disposed only in the interlayer region due to the use of acidic conditions during ion exchange.

U.S. 6,719,828

U.S. 6,719,828 discloses an ion-exchanged silicate substrate for removing mercury. The sorbent is manufactured by conducting an ion exchange between a polyvalent metal and ion exchange sites in a substrate under acidic conditions. Following ion exchange, the substrates are washed to remove the acid and stabilized using a sulfide source. "Preferably during sulfidic addition, the pH of the liquid is monitored and the acidic pH of the exchanged phyllosilicate is adjusted by the addition of alkaline sulfide solution to neutrality." *See* col. 13, lines 37-50. Because the ion exchange between a polyvalent metal and ion exchange sites is conducted under acidic conditions, the resulting sorbent has pH independent sites disposed only in the interlayer region of the substrate. The resulting sorbent is illustrated in Fig. 1, for example, and discussed at col. 23, lines 32-53 as having a layer structure 36 comprising open layers of metal sulfides lined with metal atoms 12 and sulfur atoms 14. Mercury ions or atoms 15 can enter into the interlayer openings between the pH independent ion exchange sites having metal and sulfur atoms 12, 14 and are retained by interaction with the sulfur-rich environment and amalgamation with the metal atoms.

In contrast to U.S. 6,719,828, wherein an acidic solution containing polyvalent metals is contacted with ion exchange sites in the substrate, particular embodiments of the claimed invention produce pH dependent sites by contacting a solution including dissolved polyvalent metal ions with a solution having a pH which is greater than the pH_{ZPC} of the substrate (and typically an alkaline pH), wherein ZPC refers to the zero point of charge. At pH's above the pH_{ZPC} of the substrate, pH dependent sites on the substrate are negatively charged and the polyvalent metal is in the form of a compound that is soluble under alkaline conditions, such as an ammonia complex. *See* page 11, line 6 to page 12, line 17. The polyvalent metal is thereafter ion exchanged for a metal on the substrate to form pH dependent sites on the contaminant accessible surface, edges and corners of the substrate. *See* Fig. 1 and page 21, line 11 to page 22, line 2 of the specification (emphasis added). U.S. 6,719,828 does not teach or suggest contacting a solution including dissolved polyvalent metal ions with a solution having a pH which is greater than the pH_{ZPC} of the substrate (and typically an alkaline pH), wherein ZPC refers to the zero point of charge, nor any other process for producing such pH dependent sites on the substrate.

Further, in contrast to U.S. 6,719,828, wherein the resulting sorbent has only pH independent sites in the interlayer region of the substrate, the claimed invention can also include pH dependent sites on the more contaminant accessible edges, surfaces, and corners of the substrate. The presence of polyvalent metal sulfides not only on the less contaminant accessible, interlayer positioned pH independent ion exchange sites, but also on the more contaminant accessible edge, surface, and corner positioned pH dependent ion exchange sites in particular embodiments of the claimed invention can provide an agent having superior kinetics for removing contaminants, particularly mercury. In view of the above, the claimed invention is patentable over U.S. 6,719,828.

Moreover, U.S. 6,719,828 is wholly silent as to forming an intermediate product in the manufacture of a particle for removing a contaminant from a fluid comprising polyvalent metal and *ammonia complexes* at each of a plurality of ion exchange sites, as in claim 57. (Emphasis added).

The dependent claims provide further reasons for allowance.

Claim 2 requires that the pH dependent and pH independent sites are discontinuous. (*See also* Claim 36). U.S. 6,719,828 does not teach or suggest pH dependent and independent sites, and moreover, such sites being discontinuous on the substrate.

Claim 9 requires that the pH dependent ion exchange sites are located on exposed surfaces of plates forming the substrate. (*See also* Claim 21). As discussed above, U.S. 6,719,828 does not teach or suggest ion exchange sites on exposed surfaces of the substrate, rather ion exchange sites in the interlayer region of the substrate.

Claim 39 requires that the dissolved polyvalent metal ions are compounded with ammonia in the step of contacting a solution comprising dissolved polyvalent metal ions with the substrate to form an ion exchanged substrate having polyvalent metal ions exchanged at the plurality of ion exchange sites, wherein the pH of the solution in the contacting step is greater than the pH_{ZPC} for the substrate. (*See also* Claims 58-60). U.S. 6,719,828 teaches contacting a polyvalent metal solution with the substrate under acidic conditions, not at a pH greater than the pH_{ZPC} for the substrate. Further, U.S. 6,719,828 is wholly silent as to compounding dissolved polyvalent metal ions with ammonia.

Claim 41 requires that the solution of Claim 39 has a pH of at least about 9. In U.S. 6,719,828, the contacting of the substrate with a polyvalent metal ion takes place under acidic conditions. Subsequently, the substrate is contacted with a sulfide-containing fluid to adjust the acidic pH to neutrality. "Preferably during sulfidic addition the pH of the liquid is monitored and the acidic pH of the exchanged phyllosilicate is adjusted by the addition of alkaline sulfide solution to neutrality." *See* col. 23, lines 32-53 of U.S. 6,719,828. Thus, U.S. 6,719,828 does not teach contacting the substrate with a polyvalent metal ion solution at a pH of at least about 9.

Claim 61 requires plurality of ion exchange sites on the substrate, wherein the plurality of ion exchange sites comprise a first set of sites that are pH independent and a second set of sites that are pH dependent. Claim 61 is also patentable for the reasons set forth above, U.S. 6,719,828 does not teach or suggest a substrate having a first set of sites that are pH independent and a second set of sites that are pH dependent

Applicant further wishes to clarify the intended meaning of certain claim language in light of the Federal Circuit decision "SuperGuide Corporation v. DirecTV Enterprises, Inc., et al., 358 F.3d 870 (Fed. Cir. 2004). In that decision, the Federal Circuit held, under the unique facts of that case, that the phrase "at least one of a desired program start time, a desired program end time, a desired program service, and a desired program type" means "at least one of a desired program start time, at least one of a desired program end time, at least one of a desired program service, and at least one of a desired program type."

Applicant has used the phrases "at least one of . . . and" and "and/or" in a number of claims and wishes to clarify to the Examiner the proper construction of this phrase. Applicant intended the phrases "at least one . . and" and "and/or" as used in the claims to be an open-ended expression that is both conjunctive and disjunctive in operation. For example, the expressions "at least one of A, B and C" and "A, B, and/or C" mean A alone, B alone, C alone, A and B together, A and C together, B and C together, and A, B and C together. Applicant believes that this construction is consistent with the Examiner's construction of the claims in the Office Action. If the Examiner disagrees with this construction, Applicant respectfully requests that the Examiner notify Applicant accordingly so that Applicant can further amend the claims.

Based upon the foregoing, Applicant believes that all pending claims are in condition for allowance and such disposition is respectfully requested. In the event that a telephone conversation would further prosecution and/or expedite allowance, the Examiner is invited to contact the undersigned.

Respectfully submitted,

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